Proposal Reviews

#234: Assessing the hazards of mercury and selenium to the reproductive success of birds .

US Geological Survey

Final Selection Panel Review	
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Final Selection Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Final Selection Panel Review

Proposal Number: 234

Applicant Organization: US Geological Survey

Proposal Title: Assessing the hazards of mercury and selenium to the reproductive success of birds .

Please provide an overall evaluation rating.

Fund	
As Is	**-**
In Part	**-**
With Conditions	**-**
Consider as Directed Action	**X**
Not Recommended	**-**

Amount: **$394,922.00**

Conditions, if any, of approval (if there are no conditions, please put "None"):

None

Provide a brief explanation of your rating:

The Clean Estuary Partnership commented on this proposal, recommending that it be implemented concurrently with CALFED-supported Bay-Delta wetland restoration projects, in order to assess whether potential mercury methylization associated with the restorations affects the Bay's sensitive biota. The Selection Panel is aware that wetlands are sites of active methylmercury production. Encouraging the coordination of wetland restoration and mercury research projects should be an objective of the science program's mercury workshop, the Selection Panel recommends.

Initial Selection Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Initial Selection Panel Review

Proposal Number: 234

Applicant Organization: US Geological Survey

Proposal Title: Assessing the hazards of mercury and selenium to the reproductive success of birds .

Please provide an overall evaluation rating.

Explanation of Recommendation Categories: Fund

- **As Is** (a proposal recommended for funding as proposed)
- **In Part** (a proposal for which partial funding is recommended for selected project phases or components)
- **With Conditions** (a proposal for which funds are recommended if the applicant contractually agrees to meet the specified conditions)

Consider as Directed Action in Annual Workplan (a proposal addressing a high priority action that requires some revision followed by additional review prior to being recommended for funding)
Not Recommended (a proposal not currently recommended for funding-after revision may be considered in the future)

Note on "Amount":

For proposals recommended as Fund As Is, Fund In Part or Fund With Conditions, the dollar amount is the amount recommended by the Selection Panel.

For proposals recommended as Consider as Directed Action in Annual Workplan, the dollar amount is the amount requested by the applicant(s).

Fund	
As Is	**-**
In Part	**-**
With Conditions	**-**
Consider as Directed Action	**X**
Not Recommended	**-**

Amount: **$394,922.00**

Conditions, if any, of approval (if there are no conditions, please put "None"):

None

Provide a brief explanation of your rating:

This proposal addresses topics of significant ecological concern, the effects of methylmercury and selenium (singly and in combination) on avian reproduction. This is an area for which definitive experimental research is needed, given that diminished reproductive success could adversely affect bird populations in areas where dietary exposure to methylmercury and/or selenium is high. Prior work in the Bay-Delta ecosystem has shown that mercury concentrations in eggs of some nesting aquatic birds exceed threshold concentrations associated with adverse effects on developing embryos in laboratory experiments with avian test species, such as mallards. The applicants are accomplished scientists with extensive experience in avian toxicology, including effects of methylmercury and selenium on reproductive success (and other toxicological endpoints) in birds.

Regional reviews generally recognized the importance of mercury and selenium as significant issues for restoration projects, but expressed concern that the proposed project would have little application to management decisions regarding ecological restoration projects. The consensus of science reviewers and the selection panel is that the proposal needs further development and refinement. Needed improvements include (1) a much stronger illustration of the potential utility and application of project results to management planning and ecological restoration, (2) a description of approaches for relating results from the proposed egg-injection experiments to the situation in the field, which involves dietary exposure in wild birds atop food webs in the Bay-Delta ecosystem, and (3) the crafting of timely research products (beyond papers in refereed scientific journals) that will benefit managers and decision makers involved with ecological restoration in the Bay-Delta ecosystem. One of these concerns (2) can be partly addressed by combining this field study with proposal 228 (Mercury in birds of the Bay/Delta Watershed: adverse effects to reproduction and patterns of bioaccumulation by S. Schwartzbach), combining laboratory and field studies into a single integrated, cost-effective proposal. The Panel recommends that at least one of the two applicants on this proposal participate in the Mercury Science Strategy Workshop being planned by CALFED for fall 2002. The applicants should consider and incorporate recommendations emanating from that workshop into a revised, integrated proposal for consideration as a directed project.

Research and Restoration Technical Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Research and Restoration Technical Panel Review Form

Proposal Number: 234

Applicant Organization: US Geological Survey

Proposal Title: Assessing the hazards of mercury and selenium to the reproductive success of birds .

Review:

Please provide an overall evaluation summary rating:

Superior: outstanding in all respects;
Above Average: Quality proposal, medium or high regional value, and no significant administrative concerns;
Adequate: No serious deficiencies, no significant regional impediments, and no significant administrative concerns;
Not Recommended: Serious deficiencies, significant regional impediments or significant administrative concerns.

Overall Evaluation Summary Rating	Provide a brief explanation of your summary rating
-Superior	**This project will help continue a research program at a distant laboratory and the studies proposed need to be done for understanding the effects of Hg and Se contamination on reproductive success. The direct benefits to the Bay-Delta region are not clear and these concerns were voiced by 2 external reviewers and regional review panels. The PIs thus fell short in truly explaining the interpretative powers and benefits of this work to the management concerns. More innovative and applicable studies could be done regarding Hg risk-assessment and birds in the CALFED zone. The PIs respond to the CALFED advisory committees call for interactions between Hg and Se yet they did not present an adequate study design for review.**
-Above average	
XAdequate	
-Not recommended	

1. **Goals and Justification.** Does the proposal present a clear statement of goals, objectives and hypotheses? Does the proposal present a clear justification and conceptual model for the project?

   This is a laboratory-oriented study to help establish critical levels of Hg for regulatory purposes, and there will be some effort to coordinate with other field studies going-on in the CALFED zone. There are also goals for technique development and further understanding of how egg injections for toxicity evaluations can be made more realistic toward field evaluations. No specific hypotheses are stated, but goals and questions are related to the needs for evaluations in field populations of birds.

A study such as this is definitely warranted based on the unknowns of current mercury toxicology research. This is one of the few groups in the country with the breadth of experience and the facilities to undertake such a study. In extrapolating to piscivorous birds of the Bay-Delta, they propose to continue to use the egg injection technique when there is no idea where "clean" eggs can be found for those species of interest--otherwise the experimental work on field-collected eggs will be difficult to interpret, given the levels of various compounds, including Hg, already in the eggs. Why hasn't the injection work on thousands of eggs of numerous species (including numerous piscivores) in previous work of the authors (p. 3 of proposal) generated some useful results for the CALFED zone?

2. **Likelihood of Success (Approach, Feasibility, Capabilities and Performance Measures).** Is the project likely to succeed based on the approach, feasibility and project team capabilities? Are the proposed performance measures adequate for measuring the project's success?

   The approach lacks detail of which avian samples will be taken and from what sort of contrasting environments within the Bay area are to be compared. There are some passing references to the clapper rail, yet one is left to guess how and where samples directly applicable to this ecosystem will eventually be collected and the results transferred. There is also mention about collection and transport of samples from California to Maryland, but not even an estimate of how many and when.

   In one instance in the proposal the authors justify egg injection work as a basis to predict bioaccumulation from fish levels to egg levels. One is to assume that this is based on comparisons of egg-injection results to values in fish from previous studies. Throughout the proposal mention is made of "food-chains" evaluation of harmful levels, but no detail is given on how that will be accomplished. One is to assume that this will be done through comparisons of various fish to egg conversions from the literature, based on the egg levels they determine from this study, and in using feeding study conversions these authors have determined from other studies.

   Extensive collections (basically hundreds of eggs) are planned, yet it is unclear how this will interfere with other contaminant studies of the species of interest; and how various populations of breeding piscivorous birds in the SF Bay delta area will respond to the high level of "investigatory disturbance". Let alone just finding uncontaminated populations to make egg injections more realistic and interpretable. The authors state "we do not expect field collections to be a problem."

   The addition of the mercury-selenium additions is an interesting sidelight, yet there is no mention of how widespread this effect is in the Bay-Delta region. The PIs could have strengthened their arguments by providing data on at least some environmental measurements in the Bay-Delta region. There is simply no scaling of their efforts to similar problems in the Bay. It is a bit shaky, albeit honest, for the PIs to acknowledge that for a 400K project we cannot predict how our results will lead us from one study to the next. This could have been the exact point in the proposal that they set a flowchart or a sense of achieving milestones, that lead to a final description of how this study will benefit management concerns. A list of peer-reviewed papers, most of which will come after the project has ended, is clearly not a real-time assessment of performance.

3. **Outcomes and Products.** Will the project advance the state of scientific knowledge in general and/or make an important contribution to the state of knowledge of the Bay-Delta Watershed? For restoration proposals, is the project likely to contribute to ecosystem restoration or species recoveries in a significant way? Will the project produce products useful to decision-makers and scientists?

It is unclear what management products will be from this study. To what level of certainty are the results transferable? A list of peer-reviewed articles may not be the best end-products of this research.Obviously, the PIs are leading experts in this topic and have a proven track record on avian effects of Hg contamination. They are one of a few labs suited to take on this type of work.

4. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   This is a rather expensive project without clear-cut results for management concerns in the region. As an NSF-type project, the funding is about right. The CALFED panel will have to balance the need for basic research such as this with directed research that addresses direct assessment of the problems in the Bay-Delta.

5. **Regional Review.** How did the regional panel(s) rank the proposal (High, Medium, Low)? Did the regional panel(s) identify significant benefits (regional priorities, linkages with other activities, local involvement) or impediments (local constraints, conflicts with other activities, lack of local involvement) to this proposal? What were they?

   Bay Regional Review- Low The regional panel favors environmental water quality projects that provide the information about mercury in the region, especially when the information can be helpful in making decisions about mercury management in restoration projects. This project is not closely linked to decisions about restoration projects. Unclear statement: in the past, those who have collected eggs for us have gotten their state & federal permits, so this is not something weve had to be involved with. Who will collect them if the grant is awarded? Is this entity familiar with the permitting requirements? Mercury and selenium are significant issues for restoration projects; We do need good science to help direct restoration projects. Unfortunately, it was difficult for the Bay/Suisun Regional panel to strongly link this proposal directly to the CalFed restoration priorities applicable to the region as outlined in the PSP. Committee felt that the proposal was technically of interest but would not provide information which would as applicable as other proposals in making decisions about mercury management and cleanup.

   Delta Regional Review- Low Panel did not feel that proposal, as presented, would provide scientific information that will be helpful in making decisions in the Delta. The panel agreed that current evaluations of mercury contamination in fish and benthic organisms in the Delta are expected to provide information that will guide restoration strategies for the Delta. The proposal could represent an element of a regional scale monitoring effort to document expected improvements associated CALFED ERP activities for the next 20 years

   San Joaquin Regional Review - Low This project was thought to be addressing a problem that was primarily a Bay-Delta issue without much direct relevance to the SJ Valley. Proposal doesn't say that we have found elevated levels of mercury in wild birds in the Bay/Delta ecosystem (refers to elevated levels in birds from other parts of the US), so the magnitude of the problem appears uncertain.

   Sacramento Regional Review - Low This project is about developing protocols for assessing the magnitude of the problem and directs benefits to the CALFED ERP, if any, will be a long time in coming.

6. **Administrative Review.** Were there significant concerns about the proposal with regard to the prior performance, environmental compliance and budget administrative reviews? What were they?

Applicant has included $9,000 for unspecified contingency costs.

Miscellaneous comments:

None

Bay Regional Review: #1

Proposal Number: 234

Applicant Organization: US Geological Survey

Proposal Title: Assessing the hazards of mercury and selenium to the reproductive success of birds .

Overall Ranking: **X**Low **-**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

The regional panel favors environmental water quality projects that provide the information about mercury in the region, especially when the information can be helpful in making decisions about mercury management in restoration projects. This project is not closely linked to decisions about restoration projects.

1. Is the project feasible based on local constraints?

   -Yes **X**No

   How?

   Unclear in the past, those who have collected eggs for us have gotten their state & federal permits, so this is not something weve had to be involved with. Who will collect them if the grant is awarded? Is this entity familiar with the permitting requirements?

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   Yes A weak connection to MR #5 (Ensure that impaired water quality doesn't threatend restoration) bullets 2 & 4 Hg & Se

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   -Yes **X**No

   How?

   No The link from these experiments (goals: rank sensitivity of wild species and predict quantity of mercury to cause reproductive failure) to environmental health toxicity (when is mercury available, in which flora or fauna, in which forms and at what concentrations) is many future related studies away. This project is not closely linked to decisions about restoration projects.

4. Does the project adequately involve local people and institutions?

XYes **-**No

How?

Yes the applicant is a local institution, and the project is related to local USFWS work

Other Comments:

Mercury and selenium are significant issues for restoration projects; We do need good science to help direct restoration projects. Unfortunately, it was difficult for the Bay/Suisun Regional panel to strongly link this proposal directly to the CalFed restoration priorities applicable to the region as outlined in the PSP.

Bay Regional Review: #2

Proposal Number: 234

Applicant Organization: US Geological Survey

Proposal Title: Assessing the hazards of mercury and selenium to the reproductive success of birds .

Overall Ranking: **X**Low **-**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

Committee felt that the proposal was technically of interest but would not provide information which would as applicable as other proposals in making decisions about mercury management and cleanup.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   The proposal would continue work associated with a previously funded project assessing the effects of mercury on nesting bird. Techniques have been developed to do the necessary testing and analysis.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   Multi-Regio Bay Delta Priorities:

   5. Mercury

   CalFed Science panel supported continued investigations with the inclusion of selenium.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   Proposal would be undertaken in associaton with other CalFed funded mercury research studies.

4. Does the project adequately involve local people and institutions?

   XYes **-**No

   How?

   Research project coordinated with other reseach in the area. Information would be deseminated through reports and peer reviewd journals.

Other Comments:

none

Delta Regional Review:

Proposal Number: 234

Proposal Title: Assessing the hazards of mercury and selenium to the reproductive success of birds .

Overall Ranking: **X**Low **-**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

Panel did not feel that proposal, as presented, would provide scientific information that will be helpful in making decisions in the Delta. The panel agreed that current evaluations of mercury contamination in fish and benthic organisms in the Delta are expected to provide information that will guide restoration strategies for the Delta. The proposal could represent an element of a regional scale monitoring effort to document expected improvements associated CALFED ERP activities for the next 20 years

1. Is the project feasible based on local constraints?

   -Yes **X**No

   How?

   Unclear; there may be significant constraints on obtaining access across private lands. Based on my experience, successfully obtaining eggs from colonial birds may be more difficult than implied by the project proposal.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   The two multi-regional priorities are:

    Ensure restoration is not threatened by degraded environmental water quality
    Ensure recovery of at-risk species by developing conceptual understanding and models of process that cross multiple regions

   The Delta region priority is:

    Restore shallow water habitats in the delta for the benefit of at-risk species while minimizing potential adverse effects of contaminants.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

How?

 Proposal claims to be able to guide future restoration and remediation actions. However, it is unclear how the studys results will be used to help carry out a widely supported ecosystem restoration plan for the area. Other than identifying that birds that eat fish with elevated levels of mercury may exhibit reduced reproductive success, it isnt clear how information that will inform impending decisions by landowners, ecosystem restoration agencies, environmental regulators, or other policymakers.

 It remains unclear how these data will actually guide restoration and management.

4. Does the project adequately involve local people and institutions?

-Yes **X**No

How?

The proposed project provides only limited detail on a plan for local involvement.

Other Comments:

 Principle investigators are highly qualified researchers on issues such toxicity of contaminants on fish and wildlife.

 Avian bioaccumulation component as an endpoint may be a key driver of mercury control strategies.

 Impairment of avian production of piscivores birds may not a priority for CALFED independent from the need to reduce mercury contamination in fish and ensuring that no habitat restoration strategy could result in exacerbating mercury contamination.

 Analyzing data from the injection of wild bird eggs with various doses of mythylmercury may not effectively help guide managers about the level of mercury in the food chain that is takeny up by wild birds.

 Some consideration should be given to modifying this research proposal into a monitoring proposal since some arguments have been made that the eggs of piscivores birds may more accurately measure the risk of mercury contamination in fish, birds, and humans.

San Joaquin Regional Review:

Proposal Number: 234

Applicant Organization: US Geological Survey

Proposal Title: Assessing the hazards of mercury and selenium to the reproductive success of birds .

Overall Ranking: **X**Low **-**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

This project was thought to be addressing a problem that was primarily a Bay-Delta issue without much direct relevance to the SJ Valley.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   Biggest problem appears to be getting the eggs. Past work shows it is feasible and should not be a problem.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   -Yes **X**No

   How?

   Mercury is primarily a Bay-Delta problem. Selenium is a valley issue. This project was thought not to be relevant to SJ Valley priorities.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   Currently part of a multi-disciplinary CALFED project. This is the next phase of a current study.

4. Does the project adequately involve local people and institutions?

   XYes **-**No

   How?

Maybe. Only local involvement seems to be the collection of eggs. Unclear if all the eggs come from the Bay-Delta.

Other Comments:

Refer to Bay-Delta group for ranking. Not sure if other chemicals/compounds could influence results. With wild eggs, you don't have that control.

Sacramento Regional Review:

Proposal Number: 234

Applicant Organization: US Geological Survey

Proposal Title: Assessing the hazards of mercury and selenium to the reproductive success of birds .

Overall Ranking: **X**Low **-**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

Proposal doesn't say that we have found elevated levels of mercury in wild birds in the Bay/Delta ecosystem (refers to elevated levels in birds from other parts of the US), so the magnitude of the problem appears uncertain. This project is about developing protocols for assessing the magnitude of the problem and direct benefits to the CALFED ERP, if any, will be a long time in coming.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   Study methodology of injecting mercury into eggs and embryos (as described in the proposal) has been tried and appears to be feasible.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   The project is at least indirectly tied to the issue of mercury impacts in the Bay/Delta ecosystem. (Restoration Priority #7)

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   The project is related to the regional planning effort of determining the magnitude of ecosystem impacts of mercury concentrations in water, sediment and biota.

4. Does the project adequately involve local people and institutions?

   XYes **-**No

How?

This is basic research and does not require major involvement of local communities or other institutions. Work to be conducted at Patuxent Wildlife Research Center in MD.

Other Comments:

Proposal doesn't say that we have found elevated levels of mercury in wild birds in the Bay/Delta ecosystem (refers to elevated levels in birds from other parts of the US), so the magnitude of the problem appears uncertain. This project is about developing protocols for assessing the magnitude of the problem and direct benefits to the CALFED ERP, if any, will be a long time in coming.

This project should be evaluated and compared relative to the merits of the numerous other mercury related proposals. This needs to be done by technical experts familiar with mercury issues and study priorities.

External Scientific: #1

Research and Restoration External Scientific Review Form

Proposal Number: **234**

Applicant Organization: **US Geological Survey**

Proposal Title: **Assessing the hazards of mercury and selenium to the reproductive success of birds .**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None.

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Excellent	**I just think more innovative and applicable studies could be done regarding Hg risk-assessment and birds in the CALFED zone, but this is only one of three studies of the hundreds that even propose to study birds. This seems quite unusual to me, when a large portion of the CALFED zone of influence includes wetlands and riparian zones that are of such great importance to Pacific Flyway, as well as resident birds.**
XGood	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   This is the continuation of a study I was not aware-of before reading this proposal. It is basically a laboratory-oriented study to help establish critical levels of Hg for regulatory purposes, and there will be some effort to coordinate with other field studies going-on in the CALFED zone. There are also goals for technique development and further understanding of how egg injections for toxicity evaluations can be made more realistic toward field evaluations. No specific hypotheses are stated, but goals and questions are related to the needs for evaluations in field populations of birds. In one sense, it is apparent that risk-assessment technques for Hg are needed but on the other hand, much work has already

been done, and much useful information is available from the fine work of the co-authors of this PI themselves and many others in making field evaluations. In one sense, this proposal seems to be rehashing a fairly well-studied problem (with additional refinements and development), but expanding it to a new greographic area. The proposal implies that much less has been done to date on these kinds of probems than I think actually has been done. The authors themselves state that the use of their test species might also be unrealistic when evaluating fish-eating birds in the CALFED zone, yet they move ahead with further work on those species. In extrapolating to picivorous birds, they propose to continue to use the egg injection technique when there is no idea where "clean" eggs can be found for those species of interest--otherwise the experimental work on field-collected eggs will be difficult to interpret, given the levels of various compounds, including Hg, already in the eggs. And then, there is no idea or review of population work on fish-eating birds in the SF Bay area to indicate if even these populations are suffering less than optimal demographic performance. Why not just summarize this if even nothing more than a summary table, to convince the reviewer that there might even be a problem. Thus, the most important contribution I see in the proposed study will be in the refinement of a technique that might have some future potential in future evaluations of Hg effects on avian reproduction and embryonic survival/effects to be of some questionable application to field studies going-on in the CALFED area of interest. Why hasn't the injection work on thousands of eggs of numerous species (including numerous picivores) in previous work of the authors (p. 3 of proposal) generated some useful results for the CALFED zone? It seems like in this proposal, the goals are to inject more eggs just because they are from a different geographical area.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   The study is justified if for no other reason that the work already initiated needs to be further refined and developed. Yet, I doubt the value of further laboratory studies over expansions to good ecotoxicological field studies. In one instance in the proposal the authors justify egg injection work as a basis to predict bioaccumulation from fish levels to egg levels, I assume based on comparisons of egg-injection results to values in fish from previous studies. Wouldn't food-web studies of Hg bioaccumulation better satisfy this important comparison--important because of all the fish work proposed for the CALFED zone and the need to project these residue values to various ecosystem components in the same system. It is interesting that throughout the proposal mention is made of "food-chains" evaluation of harmful levels, but no detail is given on how that will be accomplished. I am left with having to assume that this will be done through comparisons of various fish to egg conversions from the literature, based on the egg levels they determine from this study, and in using feeding study conversions these authors have determined from other studies.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The approach is excellent as far as it goes for egg-injection experiments. The approach of meaningfully injecting picivorous SF Bay watershed species may prove as difficult as rearing some of the species in captivity for experimentation, which is something the authors imply is nearly impossible. Maybe it is time to try some of this in captivity. DCCO have been successfully bred in captivity, as have alcids, and other seabird species. If the authors want to be more innovative and applicable to the CALFED zone with specific studies then they have to begin to move away from mallards; or attempt to study wild mallards within the CALFED zone itself.

Although the authors are well-aware of the problems, a mallard feeding study with eggs being produced from it would seem to be much more realistic (unless there are already-available conversion factors from feeding experiments to egg-injection experiments, which the authors imply there are), the authors seem to want to avoid it. I ask, which would be most relevant to CALFED goals of evaluating the potential effects of Hg in its zone of responsibility.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   My first question, although it is unclear how this will be done to provide realistic and unimpeded estimates of Hg risk with egg injections, is whether the extensive collections (basically hundreds of eggs) will interfere with other contaminant studies of the species of interest; and I would be concerned as to how various populations of breeding picivorous birds in the SF Bay delta area will be doing with the high level of "investigatory disturbance" going on. Let alone just finding uncontaminated populations to make egg injections more realistic and interpretable. Just the proposal to develop injection technques to more realistically distribute injected mercury into yolk and albumen portions of the egg could take several years, although the question is an important one, considering the technique.

   Field collections might be a major problem in this study, yet the authors state "we do not expect field collections to be a problem." And very little further is said as to expected sampling scheme, how eggs will be injected and interpreted, let alone how all this is going to apply to the needed risk assessment for Hg in birds from the CALFED zone.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   The final list of publications expected is strong and it has a high probability of being delivered. All will add to the literature and perhaps help answer many of the detailed questions arising from evaluations of mercury-injected eggs; and even a comparative review study of differences in species' responses to uniformly injected MeHg. This will assist in risk-assessments for avian risk from Hg in the future, which is an ultimate goal of the CALFED program. How realistic these evaluations will be in relation to actual field studies on real populations will be another question. These studies are striving to achieve better evaluations.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   The products are mostly publications in professional journals, hopefully with some value in interpretations of risk assessment. How useful to evaluations on restoration and management in the specific CALFED zone, are in my opinion, problematic.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The two investigators in this project have national reputations for evaluating toxicological risk in birds from various chemicals, as well as elucidating and applying biomarker research to avian toxicity risk assessment. They are well established and located at one of the finest facilities

in the nation to conduct research like proposed here. Therefore, as proposed, this project has a very high probability of yielding publishable results. The applicability of the work is problematic but likely to be of some use in larger-scale risk-assessments.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   For three years, the estimated budged is about $130,000 per year and reasonable in light of the amount of work to be done. As the budget is not excessive for the potential benefits that might be achieved with the particular technique, and despite the reservations I have, I think the capabilities of the investigators are likely to increase the probability of providing a satisfactory product, that might just have some application in the CALFED risk-assessment efforts.

Miscellaneous comments:

External Scientific: #2

Research and Restoration External Scientific Review Form

Proposal Number: **234**

Applicant Organization: **US Geological Survey**

Proposal Title: **Assessing the hazards of mercury and selenium to the reproductive success of birds .**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**This is an excellent proposal on the effects of mercury on wild bird species that should provide a valuable complement to field effect and exposure studies. The applicants have demonstrated their abilities to conduct this kind of study and I believe the project has a high likelihood of success.**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   The goal of this study is to examine the effects of mercury injected into fertile wild bird eggs and compare these effects with those measured in more common test species for which both injection studies and dietary exposure studies have been conducted. Ultimately the goal is to rank the sensitivities of many wild species and predict how much mercury in their diet and in their eggs is sufficient to cause reproductive failure.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

This project is a continuation of earlier work and is based on the results of the earlier study. The questions are clearly stated and the scale of the work is justified on the basis of results from the earlier project. In particular the plan to examine mercury-selenium interaction effects was recommended by CALFED's scientific review committee.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The approach of injecting wild eggs with mercury and examining effects under controlled laboratory conditions has the advantage over uncontrolled field surveys of removing potentially confounding variables and should aid in establishing cause - effect relationships. This approach is also more cost-effective than breeding fish-eating birds in captivity. The project should generate new information on the relative sensitivities of bird species to mercury, and potentially developments with regard to improved methodology for future injection studies. If successful the results of the project should aid decision-makers in determining acceptable exposure levels of mercury for wild bird species.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   The authors have already demonstrated that their approach is technically feasible and the proposed project should lead to further refinements and improvements in the methods used. I believe the likelihood of success is high and that the scale is appropriate.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   The performance measures are described to be primarily peer-reviewed publications and presentations at scientific conferences. The topics for such papers are outlined.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Though the applicants describe their products as peer-reviewed publications and presentations, it is my impression that an important product should ultimately be a set of recommendations to environmental managers.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   Both applicants are highly experienced and have a proven track record in wildlife effects of toxic chemicals. The infrastructure is clearly available as this is an expansion of an ongoing project.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   This 3 year project is a continuation of an ongoing CALFED project. The work itself will be conducted in the labs at the Patuxent Wildlife Research Center. The total budget for the project is $400,913. As far as I can tell this appears to be a very reasonable budget with a relatively high benefit-to-cost ratio.

Miscellaneous comments:

It is not entirely clear how concentrations of mercury in fish that would result in harmful residues in eggs will be derived. This ultimately could be important in a management context.

External Scientific: #3

Research and Restoration External Scientific Review Form

Proposal Number: **234**

Applicant Organization: **US Geological Survey**

Proposal Title: **Assessing the hazards of mercury and selenium to the reproductive success of birds .**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

none

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Excellent	**The research panel must decide how this project relates to the overall plan to restore this ecosystem. In its current state, this project will help continue a research program at a distant laboratory, yet the direct benefits to the Bay-Delta region are not clear. There is mention of association with another project in the same call for proposals but no mention of how the success of this project is related to separate funding for the companion project. There is a need to conduct this research, but the PIs fell short in truly explaining the benefit of this work to the management concerns in the region.**
XGood	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   The goals of this proposal are well-defined, even though the success of the overall proposal lies in the application of the method applied in the first goal. That is the nature of such a research project, especially in the field of toxicology. The study certainly addresses an area of concern for biota in the Bay-Delta Region. The PIs show that they have been in tune with specific recommendations of the CALFED science advisory group (perhaps directly involved).

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   A study such as this is definitely warranted based on the unknowns of current mercury toxicology research. This is one of the few groups in the country with the breadth of experience and the facilities to undertake such a study. This is certainly classified as a research project in its truest sense. This is a methods development project in toxicological research that will eventually pay dividends for assessment and management of the Bay-Delta avian contamination threat.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   While this project is one that will generate useful data for modeling responses to potential management options for the Bay-Delta, it really reads as if it were an NSF-type proposal looking for a home in this funding opportunity. The authors have made reference to the needs of the CALFED panel, yet they came up a bit short on how these results will directly influence predictions about bioaccumulation and management options for the Bay-Delta region. What will the results of this project specifically give management concerns? How are direct dosing to eggs comparable to bioaccumulation through fish from the region? I think that there are some relationships to be drawn, but without a conceptual model, it would be difficult to do.

   The approach also does not specifically address which avian samples will be taken and from what sort of contrasting environments within the Bay area. The are some passing references to the clapper rail, yet one is left to guess how and where samples directly applicable to this ecosystem will eventually be collected and the results transferred. There is also mention about collection and transport of samples from California to Maryland, but not even an estimate of how many and when.

   The addition of the mercury-selenium additions is an interesting sidelight, yet there is no mention of how widespread this effect is in the Bay-Delta region. The PIs could have strengthened their arguments by providing data on at least some environmental measurements in the Bay-Delta region. There is simply no scaling of their efforts to similar problems in the Bay.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   While this project is one that will generate useful data for modeling responses to potential management options for the Bay-Delta, it really reads as if it were an NSF-type proposal looking for a home in this funding opportunity. The authors have made reference to the needs of the CALFED panel, yet they came up a bit short on how these results will directly influence predictions about bioaccumulation and management options for the Bay-Delta region. What will the results of this project specifically give management concerns? How are direct dosing to eggs comparable to bioaccumulation through fish from the region? I think that there are some relationships to be drawn, but without a conceptual model, it would be difficult to do.

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5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   It is a bit shaky, albeit honest, for the PIs to acknowledge that for a 400K project we cannot predict how our results will lead us from one study to the next. This could have been the exact point in the proposal that they set a flowchart or a sense of achieving milestones, that lead to a final description of how this study will benefit management concerns. A list of peer-reviewed papers, most of which will come after the project has ended, is clearly not a real-time assessment of performance.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Again, a difficult question is what the management products will be from this study. To what level of certainty are the results transferable? A list of peer-reviewed articles may not be the best end-products of this research.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   Obviously, the PIs are leading experts in this topic and have a proven track record on avian effects of Hg contamination. They are one of a few labs suited to take on this type of work.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   This is a rather expensive project without clear-cut results for management concerns in the region. As an NSF-type project, the funding is about right. The CALFED panel will have to balance the need for basic research such as this with directed research that addresses direct assessment of the problems in the Bay-Delta.

Miscellaneous comments:

Prior Performance/Next Phase Funding:

New Proposal Number: 234

New Proposal Title: Assessing the hazards of mercury and selenium to the reproductive success of birds .

1. Prior CALFED project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   NOTE the Prior/Ongoing CALFED Project Title and Number do not match on the faxed list and the beginning and end of the title is missing -- you have listed ....matter in the habitat and its relationship to the food chain....as 97-B06?? Following are the three agreements with correct Title and Number and Project Manager that I have administered with USGS:

   CALFED #97-B02, USBR #98-AA-20-16230 - U.S. Geological Survey - Sedimentation Movement, Availability and Monitoring in the Delta - David Schoellhamer

   CALFED #97-B06, USBR #98-AA-20-16240 - U.S. Geological Survey - Assessment of the Sacramento-San Joaquin River Delta as Habitat for Production of the Food Resources that Support Fish Recruitment - William Sobczak

   CALFED #98-B07, USBR #98-AA-20-16950 - U.S. Geological Survey - Assessment of the Impacts of Selenium on Restoration of the San Francisco Bay-Delta Ecosystem - Sam Luoma

2. Prior CVPIA project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   N/A

3. Have negotiations about contracts or contact amendments with this applicant proceeded smoothly, without persistent difficulties related to standard contract terms and conditions?

   -Yes **-**No **X**N/A

   If no, please explain any difficulties:

4. Are the status, progress, and accomplishments of the applicant's current CALFED or CVPIA project(s) accurately stated?

   -Yes **-**No **X**N/A

   If no, please explain any inaccuracies:

5. Is the applicant's progress towards these project(s)' milestones and outcomes to date satisfactory?

   -Yes **-**No **X**N/A

   If no, please explain deficiencies:

6. Is the applicant's reporting, records keeping, and financial management of these projects satisfactory?

   -Yes -No **X**N/A

   If no, please explain deficiencies:

7. Will the project(s) be ready for next phase funding in 2002, based on its current progress and expenditure rates?

   -Yes -No **X**N/A

   If no, please explain:

Other Comments:

USGS agreements are invoiced directly through a central billing system and do not require my personal approval as an interagency agreement, therefore it is a little harder to track aside from deliverables and quarterly reports received. All three USGS agreements are complete, with a final report due from 98-B07, agreement ending December 31, 2001. No problems encountered in my dealings with the three project managers for 97-B02, 97-B06, or 98-B07.

Environmental Compliance:

Proposal Number: 234

Applicant Organization: US Geological Survey

Proposal Title: Assessing the hazards of mercury and selenium to the reproductive success of birds .

1. Are the legal or regulatory issues that affect the proposal identified adequately in the proposal?

   -Yes **X**No

   If no, please explain:

   Due to federal agency funding, NEPA compliance may be required.

2. Does the project's timeline and budget reflect adequate planning to address legal and regulatory issues that affect the proposal?

   -Yes **X**No

   If no, please explain:

   If NEPA is necessary, money and time to complete the documents and consultation process should be included in the budget and timeline.

3. Do the legal and regulatory issues that affect the proposal significantly impair the project's feasibility?

   -Yes **X**No

   If yes, please explain:

Other Comments:

Budget:

Proposal Number: 234

Applicant Organization: US Geological Survey

Proposal Title: Assessing the hazards of mercury and selenium to the reproductive success of birds .

1. Does the proposal include a detailed budget for each year of requested support?

   XYes **-**No

   If no, please explain:

2. Does the proposal include a detailed budget for each task identified?

   XYes **-**No

   If no, please explain:

3. Does the proposal clearly state the type of expenses encompassed in indirect rates or overhead costs?

   XYes **-**No

   If no, please explain:

4. Are appropriate project management costs clearly identified?

   -Yes **X**No

   If no, please explain:

   Applicant does not expect any appreciable costs realted to PM that are not covered by general salaries of investigators.

5. Do the total funds requested (Form I, Question 17A) equal the combined total annual costs in the budget summary?

   -Yes **X**No

   If no, please explain (for example, are costs to be reimbursed by cost share funds included in the budget summary).

   Cost share inlcuded in budget table.

6. Does the budget justification adequately explain major expenses?

   XYes **-**No

If no, please explain:

7. Are there other budget issues that warrant consideration?

XYes **-**No

If yes, please explain:

Applicant has included $9,000 for unspecified contigency costs.

Other Comments: